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STOPLOGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 36	(1992) Structural Steel
ASTM A 240	(1993) Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
ASTM A 276	(1998b) Stainless Steel Bars and Shapes
ASTM A 325	(1994) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 370	(2002e1) Mechanical Testing of Steel Products
ASTM A 449	(1993) Quenched and Tempered Steel Bolts and Studs
ASTM A 563	(1997) Carbon and Alloy Steel Nuts
ASTM A 572	(1992b) High-Strength Low-Alloy Columbian-Vanadium Steel of Structural Quality
ASTM A 673/A 673M	(2002) Sampling Procedure for Impact Testing of Structural Steel
ASTM A 709/A 709M	(2000) Carbon and High-Strength Low-Alloy Structural Steel Shapes, Plates, and Bars and Quenched-and-Tempered Alloy Structural Steel Plate for Bridges
ASTM B 221	(2002) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 308	(1996) Aluminum-Alloy 6061-T6 Standard

	Structural Profiles
ASTM D 4020	(2001a) Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
ASTM D 413	(1998) Rubber Property - Adhesion to Flexible Substrate
ASTM D 2000	(2001) Rubber Products in Automotive Applications
ASTM F 593	(2002) Stainless Steel Bolts, Hex Cap Screws, and Studs

AMERICAN WELDING SOCIETY (AWS)

AWS D1.5	(1995) Bridge Welding Code, U.S. Units
AWS D1.6	(1999) Structural Welding Code - Stainless Steel

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-2-2105	(1993: R May 1994) Design of Hydraulic Steel Structures

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Stoplog Rubber Seal Adhesive; FIO

Data regarding adhesive properties and intended use and application instruction.

SD-04 Drawings

Detail Drawings; GA

Detail drawings shall be submitted as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-07 Schedules

Materials; FIO

Materials orders, materials lists and materials shipping bills shall be submitted as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-09 Reports

Tests, Inspections, and Verifications; FIO

Certified test reports for material tests shall be submitted with all materials delivered to the site.

SD-13 Certificates

Welding; FIO

Schedules of welding procedures for structural steel and welding processes for aluminum shall be submitted as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

SD-18 Records

Materials Disposition Records; FIO

A system of identification which shows the disposition of specific lots of approved materials and fabricated items in the work shall be established and submitted before completion of the contract.

SD-19 Operation and Maintenance Manuals

Operation and Maintenance Manuals; FIO

Submit O&M Manuals for stoplogs before completion of the contract.

1.3 QUALIFICATION OF WELDERS AND WELDING OPERATORS

Qualification of welders and welding operators shall conform to the requirements of Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

1.4 DELIVERY, STORAGE AND HANDLING

Delivery, handling and storage of materials and fabricated items shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

1.4.1 Rubber Seals

Rubber seals shall be stored in a place which permits free circulation of air, maintains a temperature of 70 degrees F or less, and prevents the rubber from being exposed to the direct rays of the sun. Rubber seals shall be kept free of oils, grease, and other materials which would deteriorate the rubber. Rubber seals shall not be distorted during handling.

PART 2 PRODUCTS

2.1 DISCHARGE CHAMBER / GATED OUTLET STOPLOG PANELS

2.1.1 General Design

Design discharge chamber / gated outlet stop log panels according to EM 1110-2-2105. Design discharge chamber / gated outlet stoplog panels and guides for unseating head conditions using maximum head conditions (See Schedule). Discharge chamber / gated outlet stoplog panels shall be constructed entirely of stainless steel. If design results in fracture critical members appropriate AWS code must be followed and all required non-destructive testing reports must be submitted for Government approval. FCM requirements are as follows: Welding procedures must be qualified by AWS (in this case D1.6), Welders and welding operators must be qualified (AWS D1.6), Welds must be tested and accepted according to AWS D1.6. Material must meet toughness requirements. Charpy V-notch impact test results and material certifications for base and weld metals are required. Test procedures should follow ASTM A 370, ASTM A 673/A 673M Base metal toughness requirements should satisfy Table S1.3 of ASTM A 709/A 709M. Zone 2 requirements are acceptable for this application. Weld metal toughness should meet the requirements identified in AWS D1.5 Table 12.1. All hardware shall be stainless steel. The seal detail provided in the contract drawings shall be followed for the sides. The contractor must design the top and bottom seals. The discharge chamber / gated outlet stoplog panels must be dimensionally compatible with the frames in the previous phases. Field verify existing slot dimensions of Grand Forks Phase I and Phase II structures at C-3, D-1, D-2, E-2, C-1, D-3, E-1, and F-1.

2.1.2 Frame

The frames shall made from stainless steel built up sections or hot dipped galvanized wide flanged beams. The frame shall be suitable for casting into the wall or mounting on a concrete wall, embedded in a channel, or installed inside an existing channel as shown on the contract drawings for each location. If fractural critical members result in the design, the same NDT requirements as described in the general design criteria apply.

2.1.3 Stoplog Panel

The stoplog panel shall consist of a flat plate reinforced with formed plated or structural members to limit their deflection to 1/360 of the gate's span under the design head. Each end of the panel shall have a UHMWPE (Ultra high molecular weight polyethylene) guide block to ensure proper alignment of the panel, to reduce friction, and to prevent metal-to-metal contact. Permanently mark design head on each stop log panel by welding in an appropriate location as approved by the COR.

2.1.4 Seals

Seals shall be made of ethylene-propylene-diene-monomer (EPDM) rubber. The end seals shall be attached to the stop log panel by means of

a UHMWPE guide block. The bottom seal is attached to the stop log panel with a stainless steel retainer.

2.1.5 Materials

Part	Material
Frame, Log, Reinforcements And bottom seal retainer	Stainless Steel ASTM A 240, Type 304L or 316L
Guide	Ultra high molecular weight Polyethylene UHMWPE ASTM D 4020
Seal	EPDM ASTM D 2000
Fasteners	ASTM F 593 GR-1 for Type 304 or GR-2 for Type 316

2.1.6 Schedule

Location	Design Head (feet)	Panel Size (inches)
A-1	41	108 x 108
A-3 Gated Outlet	42	60 x 60
C-4 Gated Outlet	42	60 x 60
C-5	42	60 x 60
H-4 Gated Outlet	41	108 x 108
H-1	41	108 x 108
H-1 Gated Outlet	42	60 x 60

2.1.7 Quantities

Provide six 60 inch by 60 inch discharge chamber / gated outlet stoplog panels. Provide three 108 inch by 108 inch discharge chamber / gated outlet stop log panels.

2.2 CLOSURE STRUCTURE STOPLOGS

2.2.1 Stoplogs

Stoplogs shall be fabricated from aluminum tubes to the dimensions indicated on the drawings. Seal pads shall be bonded to the stoplogs as indicated on the drawings with an adhesive recommended by the manufacturer of the seal pad material and as approved and suited to the intended use. The pads shall also be attached with screws to the stoplogs as indicated on the drawings.

2.2.2 Stoplog Grooves and Sill

Extra care shall be taken in the fabrication and installation of the stoplog grooves and sills to ensure that leakage is kept to a minimum. If leakage is excessive and misalignment of the grooves and/or sills, or their componet parts, is a contributing factor to the leakage, the Contractor

shall propose corrective measures and shall implement corrective measures at no additional cost to the Government. Stoplog Groove and end sill surfaces in contact with concrete shall be coated with a bonding agent equal to Sika Armatec 110.

2.2.3 Materials

Materials orders, materials lists and materials shipping bills shall conform to the requirements of Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.2.3.1 Seal Pads

Seal pad material shall be fabricated from material having the same characteristics and material properties as one of the following products. The adhesive used to bond the material to the stoplog shall be recommended by the manufacturer and as submitted and approved. The following manufacturers are acceptable:

a. Custom Urethane Elasomers, Inc.: Compound PO-655.

b. Seals Unlimited, Inc.: Product 75A.

c. Wendt Productions, Inc.: Keelshield (smooth surface).

2.2.3.2 Structural Steel

All structural steel shall conform to ASTM A 572, Grade 50, or ASTM A 709/A 709M, unless specified otherwise. All structural steel shall be galvanized after fabrication except stainless steel. Material requirements for FCM shall be as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.2.3.3 Structual Aluminum

Structural aluminum shall conform to ASTM B 221 and ASTM B 308,Alloy 6061, Temper T6.

2.2.3.4 Steel Threaded Rod

All steel threaded rod shall conform to ASTM A 449 and galvanized after fabrication.

2.2.3.5 Stainless Steel Threaded Rod

All stainless steel threaded rod shall conform to ASTM A 276. The threaded rod shall be strain hardened Type 316 with a minimum yield strength equal to 75 ksi and a minimum ultimate strength equal to 95 ksi.

2.2.3.6 Stop Tie-down Straps

Stop tie-down straps shall be 2-piece, 2 inch wide polyester webbed, with straps with flat hook on each end. A racket buckle shall be used for tightening. The minimum working load shall be 1000 pounds. The minimum

length shall be 20 feet.

2.2.3.7 Welded Shear Studs

Welded shear studs shall be Type A103. Studs shall have a minimum yield strength equal to 50 ksi and a minimum ultimate strength equal to 55 ksi.

2.2.3.8 Bolts

All bolts shall conform to ASTM A 325.

2.2.3.9 Nuts

All nuts shall conform to ASTM A 563.

2.2.3.10 Welds

All welds shall have E70 electrodes. Refer to Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS for welding requirements including requirements for Fracture Critical Members (FCM).

2.3 FABRICATION

2.3.1 Detail Drawings

Detail drawings of stoplogs and appurtenant shop fabricated items, including fabrication drawings, shop assembly drawings, delivery drawings, and field installation drawings, shall conform to the requirements specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.3.1.1 Fabrication Drawings

Fabrication drawings shall show complete details of materials, tolerances, connections, and proposed welding sequences which clearly differentiate shop welds and field welds.

2.3.1.2 Shop Assembly Drawings

Shop assembly drawings shall provide details for connecting the adjoining fabricated components in the shop to assure satisfactory field installation.

2.3.1.3 Delivery Drawings

Delivery drawings shall provide descriptions of methods of delivering components to the site, including details for supporting fabricated components during shipping to prevent distortion or other damages.

2.3.1.4 Field Installation Drawings

Field installation drawings shall provide a detailed description of the field installation procedures. The description shall include the location and method of support of installation and handling equipment; provisions to be taken to protect concrete and other work during installation; method of

maintaining components in correct alignment; and methods for installing appurtenant items.

2.3.2 Structural Fabrication

Structural fabrication shall conform to the requirements specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.3.3 Welding

Welding shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS. Stoplog assemblies are considered Fracture Critical Members (FCM). Welds and materials are to meet requirements of AWS D1.5.

2.3.4 Bolted Connections

Bolted connections shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.3.5 Machine Work

Machine work shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.3.6 Miscellaneous Provisions

Miscellaneous provisions for fabrication shall conform to the requirements specified and in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.3.7 Fabrications

2.3.7.1 Closure Stoplogs

Stoplogs shall be fabricated of aluminum 37,000 psi tensile yield strength minimum Alloy 6061, Temper T6.

2.3.7.2 Discharge Chamber / Gated Outlet Stoplogs

See paragraph STOPLOG PANEL.

2.3.7.3 Stoplog Guides, Grooves, and Sills

Stoplog guides, grooves, and sills shall be fabricated of structural steel conforming to ASTM A 36, hot-dip galvanized as specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.3.7.4 Miscellaneous Embedded Metals

Corner protection angles, frames, base plates, and other embedded metal items required for complete installation shall conform to the details shown.

2.3.8 Seal Assemblies

Seal assemblies shall consist of rubber seals, spacer bars, and fasteners. Rubber seals shall be continuous over the full length. Seals shall be accurately fitted and drilled for proper installation. Bolt holes shall be drilled in the rubber seals by using prepared templates or the retainer bars as templates. Splices in seals shall be fully molded, develop a minimum tensile strength of 50 percent of the unspliced seal, and occur only at locations shown on fabrication drawings. All vulcanizing of splices shall be done in the shop. The vulcanized splices between molded corners and straight lengths shall be located as close to the corners as practicable. Splices shall be on a 45 degree bevel related to the "thickness" of the seal. The surfaces of finished splices shall be smooth and free of irregularities. Stainless steel retainer bars shall be field-spliced only where shown and machine-finished after splicing.

2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

Tests, inspections, and verifications for materials shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

2.4.1 Testing of Rubber Seals

The fluorocarbon film of rubber seals shall be tested for adhesion bond in accordance with ASTM D 413 using either the machine method or the deadweight method. A 1 inch long piece of seal shall be cut from the end of the seal which has been masked and subjected to tension at an angle approximately 90 degrees to the rubber surface. There shall be no separation between the fluorocarbon film and the rubber when subjected to a load of 30 pounds per inch width.

Failure of any specimen to meet the requirements of the test used will be cause for rejection of the piece from which the test specimen was taken.

PART 3 EXECUTION

3.1 INSTALLATION

Discharge chamber / gated outlet stoplog panels and appurtenances shall be handled and installed in accordance with the manufacturer's recommendations or Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS whichever is more restrictive. Installation of closure structure stoplog panels shall conform to the requirements specified and in SECTION 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

3.1.1 Embedded Metals

Corner protection angles, frames, base plates, and other embedded metal items required for complete installation shall be accurately installed to the alignment and grade required to ensure accurate fitting and matching of components. Anchors for embedded metals shall be installed as shown. Items requiring two concrete pours for installation shall be attached to the embedded anchors after the initial pour, adjusted to the proper

alignment, and concreted in place with the second pour.

3.2 PROTECTION OF FINISHED WORK

Protection of finished work shall conform to the requirements specified in Section 05055 METALWORK FABRICATION, MACHINE WORK, MISCELLANEOUS PROVISIONS.

3.3 ACCEPTANCE TRIAL OPERATION

After completion of installation, the Contracting Officer will examine the stoplog installation for final acceptance. The individual components of the stoplog installation will be examined first to determine whether or not the workmanship conforms to the specification requirements. The Contractor will be required to place the stoplogs in the guides a sufficient number of times to demonstrate that the stoplogs fit properly and seat uniformly. Required repairs or replacements to correct defects, shall be made at no cost to the Government. The trial operation shall be repeated after defects are corrected.

-- End of Section --